Physics 203 Ecampus

Group Quizbit | Electric Potential and Circuits

Work with your lab group to produce a single handwritten solution to the question(s) in this Quizbit. Submit a single copy of your work to Gradescope. Writing everyone's name on the handwritten copy does not associate each student with the work, be sure to add the group member's names when submitting. The clarity of communicating your reasoning, along with providing multiple representations and clearly organizing your work will be weighed more heavily than the final answer in your grade.

Part A Hints:

$$\vec{E}_x = -\frac{\Delta V}{\Delta x}$$

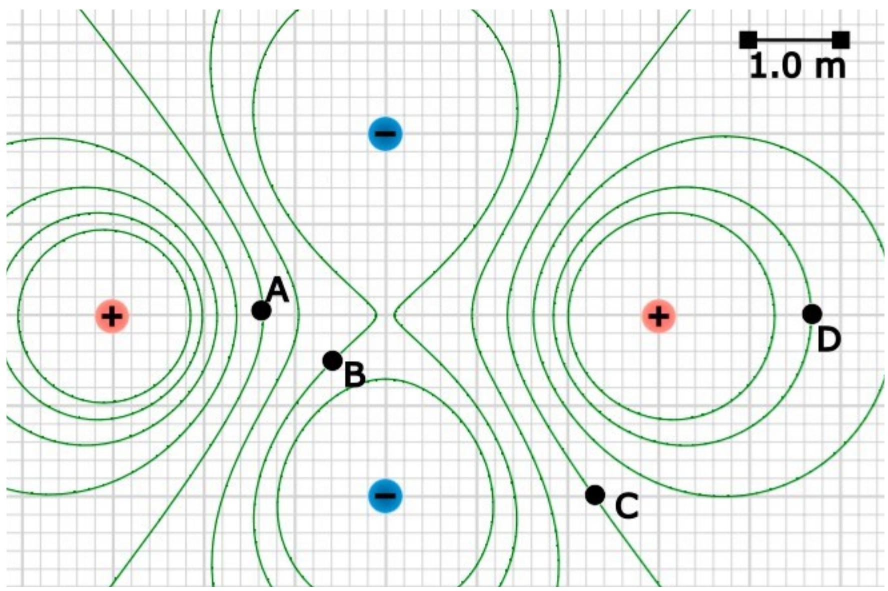
$$\vec{E} = -\left\langle \frac{\Delta V}{\Delta x}, \frac{\Delta V}{\Delta y}, \frac{\Delta V}{\Delta z} \right\rangle$$

1. The equipotential lines pictured below were created with 4 charges of equal magnitude. **Point C** is at 0 Volts. The magnitude of the potential difference between adjacent lines is 3 Volts.

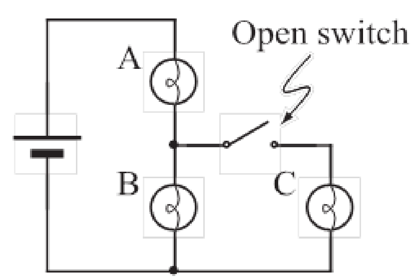
   (a) Draw a vector for each of the points labeled **A-D** representing the *direction* of the electric field at that point**.**

   (b) Rank the magnitude of the electric field at the four points labeled **A-D**. Explain how you determined your ranking.

   (c) Estimate the magnitude of the electric field at **point A**.



2. Consider the circuit in the figure which includes one battery with potential difference **ε**, three identical lightbulbs with resistance **R**, and a switch that can be open (as shown) or closed to include bulb C.



   (a) Write a set of equations using Kirchoff's Loop Rule and Junction rule for the circuit below while the switch is open, and Bulb C is not connected.

   (b) Solve for the current through Lightbulb A in terms of **ε** and **R.**

   (c) Write a set of equations for the circuit if the switch was closed and Lightbulb C was connected.

   (d) Solve for the current through Lightbulb A in terms of **ε** and **R.**

   (e) Does closing the switch (and adding lightbulb C) increase or decrease the brightness of Lightbulb A? Explain your reasoning.

$$\sum I_{in} = \sum I_{out}$$

$$\sum \Delta V = 0$$